WHAT IS CLAIMED IS:

1. A plasma processing apparatus comprising:

a grounded housing;

an RF plate electrode placed in the housing and having a thickness of 6mm or less;

an opposite electrode facing the RF plate electrode; and

an RF power source for applying a radio frequency to either the RF plate electrode or the opposite electrode to generate plasma between the two electrodes.

2. The plasma processing apparatus of claim 1, wherein if the radio frequency applied to the electrode is f (MHz), the parasitic capacity C (pF) between the grounded portion of the housing and a conductive portion through which the radio frequency propagates is less than $1210*f^{-0.9}$.

3. The plasma processing apparatus of claim 1, further comprising a heat sink that holds the RF plate electrode and has a coolant passage inside it.

4. The plasma processing apparatus of claim 3, wherein the heat sink further has a groove inside it.

5. The plasma processing apparatus of claim 3, wherein the heat sink further has a cavity.

6. The plasma processing apparatus of claim 3, wherein the heat sink is supported by a part of the housing, and a shock absorber is inserted between the heat sink and said part of the housing.

7. The plasma processing apparatus of claim 6, wherein the heat sink is made of a ceramic material and the shock absorber is a malleable insulator.

8. The plasma processing apparatus of claim 6, wherein the shock absorber is made of

Teflon.

9. The plasma processing apparatus of claim 1, further comprising:

a DC power source for supplying a direct voltage in order to hold a wafer on the RF plate electrode in an electrostatic manner; and

a radio-frequency trap positioned between the DC power source and the RF plate electrode, the radio-frequency trap having an electrical length of 1/4 wavelength of the radio frequency applied to the electrode.

10. A plasma processing apparatus comprising:

a grounded housing;

an RF plate electrode placed in the housing;

an opposite electrode facing the RF plate electrode; and

first and second radio-frequency power sources for applying different values of radio frequencies to either the RF plate electrode or the opposite electrode, one of the radio frequencies being 60MHz or higher, which is represented as f(MHz), wherein the parasitic capacity C (pF) between the grounded portion of the housing and a conductive portion through which the radio frequencies propagate is less than $1210*f^{-0.9}$.

11. The plasma processing apparatus of claim 10, further comprising a heat sink that holds the RF plate electrode and has a coolant passage in proximity to the RF plate electrode.

12. The plasma processing apparatus of claim 11, wherein the heat sink further has a groove inside it.

13. The plasma processing apparatus of claim 11, wherein the heat sink further has a cavity.

14. The plasma processing apparatus of claim 11, wherein the heat sink is supported by a part of the housing, and a shock absorber is inserted between the heat sink and said part of the housing.

15. The plasma processing apparatus of claim 14, wherein the heat sink is made of a ceramic material and the shock absorber is a malleable insulator.

16. The plasma processing apparatus of claim 14, wherein the shock absorber is made of Teflon.

17. A plasma processing apparatus comprising:

a grounded housing;

a wafer mount electrode placed in the housing and having at least two holes penetrating it, the wafer mount electrode including an RF plate electrode having a thickness of 6mm or less and an insulator for supporting the RF plate electrode;

an opposite electrode facing the wafer mount electrode;

an RF power source for applying a radio frequency to either the wafer mount electrode or the opposite electrode to generate plasma between the two electrodes; and

pusher pins inserted in the holes and movable between a first position, at which the pusher pins project out of the wafer mount electrode in order to receive a wafer, and a second position, at which the pusher pins retreat below the RF plate electrode during the generation of plasma.

18. The plasma processing apparatus of claim 17, wherein the stroke of the pusher pins between the first and second positions is twice or more of the thickness of the RF plate electrode.

19. The plasma processing apparatus of claim 17, further comprising a heat sink for holding the wafer mount electrode, wherein the insulator is a part of or the entirety of the heat sink, and the heat sink has at least one of a coolant passage, a groove, and a cavity.

20. The plasma processing apparatus of claim 19, wherein the heat sink is supported by a part of the housing, and a shock absorber is inserted between the heat sink and said portion of the housing.

21. The plasma processing apparatus of claim 17, wherein if the radio frequency applied to the electrode is f (MHz), the parasitic capacity C (pF) between the grounded portion of the housing and a conductive portion through which the radio frequency propagates is less than $1210 * f^{-0.9}$.

22. The plasma processing apparatus of claim 17, wherein the pusher pins are made of a conductor or a semiconductor.

23. A plasma processing apparatus comprising:

a wafer mount electrode;

an opposite electrode facing the wafer mount electrode;

a DC power source for supplying a direct-current voltage in order to hold a wafer on the wafer mount electrode in an electrostatic manner;

an RF power source for applying a radio frequency to either the wafer mount electrode or the opposite electrode to generate plasma between the two electrodes; and

a radio-frequency trap positioned between the wafer mount electrode and the DC power source, the radio-frequency trap having an electrical length of (2n+1)/4 wavelength of the applied radio frequency.

24. The plasma processing apparatus of claim 23, wherein the radio-frequency trap is a conductive pipe.

25. The plasma processing apparatus of claim 23, wherein the physical length of the radio-frequency trap is set shorter than (2n+1)/4 wavelength of the applied radio frequency taking into account parasitic capacity of the plasma processing apparatus and inductance of transmission lines.

26. The plasma processing apparatus of claim 23, further comprising a bypass capacitor connected in parallel with the DC power source;

wherein one end of the radio-frequency trap is connected to the wafer mount electrode, and the other end of the radio-frequency trap is connected to the DC power source and the bypass capacitor.

27. A plasma processing method comprising:

placing a wafer in a grounded housing;

producing plasma in the housing by applying a radio frequency;

processing the wafer on the condition that if the applied radio frequency is f(MHz), parasitic capacity C(pF) between the grounded portion of the housing and a conductive portion through which the radio frequency propagates is less than $1210*f^{-0.9}$.

28. The plasma processing method of claim 27, wherein the radio frequency applied to produce plasma is 60MHz or higher.